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REMARKS

In the present Office Action, claims 8 and 9 were allowed and claims 10-13 were rejected.

By this Amendment, claims 12 and 13 are amended. In addition, as discussed in detail in the Remarks, applicants submit that the rejections to claims 10-12 are untenable and should be withdrawn. Accordingly, claims 10-13 are presented for further examination. No new matter has been added.

Allowable Subject Matter and Allowed Claims

Applicants respectfully thank the Examiner for indicating claims 8 and 9 are allowed.

Objections to the Specification

The specification was objected to because it did not include a reference to the parent application. To overcome this objection, Applicants herein amend the specification to add a cross reference to the parent application U.S. Serial No. 10/201,209, now issued as U.S. Patent No. 6,814,873. Accordingly, Applicants submit the objection is overcome.

Claim Rejections Under 35 U.S.C. § 112

In the present Office Action, claim 13 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Specifically, the Examiner states that there is no clear antecedent basis for "the formula" in the previously presented claim 13. As amended, claim 13 has been rewritten in independent form thus obviating the rejection. Additionally, the formula has been amended to correct a typographical error, namely the insertion of the word "graft". Amended claim 13 is supported by the specification, as best seen in paragraph 31 and Example 4 of the specification.

Although the word "graft" is missing in the formulas shown in paragraph 31 and Example 4, a person skilled in the art should know that this is a typographical error based on the original disclosure. In Example 4 of the original specification, the polymer shown is prepared from a commercial copolymer of maleic anhydride grafted onto polybutadiene (paragraph 57, lines 1-2). Thus, it is obvious that a final product made from this grafted copolymer by the disclosed procedure should also be a grafted copolymer. In addition, the disclosure specifies that the

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formulas shown in paragraph 31 are specific examples of grafted copolymers disclosed in paragraph 29 (page 3, paragraph 32). Therefore, the omission of the word "graft" in the formulas shown in paragraph 31 and Example 4 is a typographical error. The amended claim 13 is thus supported by the specification and is presented for further examination.

Claim Rejections Under 35 U.S.C. § 103

1. Rejections as to claims 10 and 11

In the present Office Action, claims 10 and 11 were rejected under 35 U.S.C. § 103(a) as being obvious over Kobata et al., Japanese Patent No. 11-090488 (hereafter Kobata '488). The Examiner states that Kobata et al. discloses a polymer formed from acrylamide, acrylic acid and silanol groups and that the polymerization of acrylamide, acrylic acid, and the silane monomers in Kobata '488 would form a polymer according to the recited formula in claim 10 of the instant application. Applicants respectfully submit that Kobata '488 does not teach or suggest any of the polymers recited in claims 10 and 11 of the instant application, thus this rejection is untenable and should be withdrawn.

Kobata '488 relates to a scale inhibitor, especially a scale inhibitor effective in prevention of a silicic-acid system scale. Specifically, Kobata '488 teaches a scale preventing agent containing a polymer formed by the polymerization of two monomers such as acrylamide (meta) and silane monomers (see paragraph 007, line 12 and paragraph 008 of Kobata '488) and acrylic acid and silane monomers (see paragraph 007, line 8 and paragraph 008 of Kobata '488). However, Kobata '488 does not teach or suggest a scale inhibitor containing a polymer formed by three monomers such as acrylamide, acrylic acid and silane monomers, which is instantly claimed. Because the polymer disclosed in Kobata '488 is effective in reducing silicic-acid system scale, generally known by the formula $[\text{SiO}_x(\text{OH})_{4-2x}]_n$, there is no motivation for a person skilled in the art to modify the polymer disclosed in Kobata to solve the problem of aluminosilicate scale (generally known as Al_2SiO_5). Even if a person skilled in the art would have tried to modify the polymer disclosed in Kobata, there is absolutely no motivation to combine acrylic acid, acrylamide and the silanol group to form a scale inhibitor. Moreover, any polymers produced in Kobata '488 would be an acid, while the polymers in claim 10 are either sodium, potassium or ammonium salts. Hence, there is no motivation to synthesize a polymer in claim 10 of the instant application in view of Kobata '488.

Furthermore, as discussed in the instant specification, aluminosilicate scale is present in the Bayer process, and therefore, the instantly claimed compounds can be used in the Bayer

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process. See instant specification, pg. 1. Kobata '488 is neither concerned with the Bayer process nor with the compounds that can be used to reduce or prevent scale in the Bayer process. Instead, Kobata '488 addresses the problem of silicilic acid scale in boiler/cooling water systems. See Kobata '488 at paragraphs 0003 and 0004.

As discussed in the present specification, the process conditions inherent in the Bayer process are extreme and significantly different than those found in the boiling/cooling water systems described in Kobata '488. "In boilers the pH is quite mild, only 8 to 9 and dissolved salts are usually not present in concentrations more than about one to five grams/liter." See instant specification at p. 4, lines 5-7. "In contrast, the supersaturated solutions at high temperatures and high pH of essentially 14, make scaling problems much more serious and difficult to contend with in plants that carry out the Bayer process than in boilers. In addition, the concentrations of dissolved salts (i.e., sodium aluminate, sodium carbonate, sodium hydroxide, etc.) in the Bayer process are very high, such that total dissolved salt concentrations are greater than 200 grams/liter. It is not surprising, therefore, that the scales that form in the Bayer process are distinctly different from those that form in boilers and unlike boiler scales, all Bayer scales contain aluminum, which is expected because of the high concentrations of aluminum in the Bayer process, is non-existent in boiler/cooling water systems." See instant specification, p. 4, lines 10-24.

In fact, there are several key differences between the typical Bayer process conditions and the boiler/cooling system of Kobata '488, as set forth in Table 1 below.

Table 1

Process Chemistry/Conditions	A Process the Presently claimed compositions may be used in	Kobata '488
Temperature	140-240°C (instant specification, p. 1)	45-75°C (Kobata '488, p.6, lines 35-36)
pH	>14 (instant specification, p.4)	9.0 (Kobata '488, p.8, line 28)
Scale inhibition effect	Sodium aluminosilicate (sodalite) (instant specification, p. 4)	Silicilic acid (Kobata '488, p.9, Technical Problem)
Application	Bayer Process	Boiler and cooling water systems (Kobata '488, throughout)
Scale Formed	Sodium aluminosilicate	Silicilic acid, calcium carbonate/sulfate/sulfite/phosphate/silicate, magnesium silicate, hydroxide, phosphoric-acid zinc, zinc hydroxide/carbonate (Kobata '488, p. 6, lines 4-7)

Kobata '488 addresses an altogether different type of scale (silicilic acid) in an altogether different type of process, having altogether different process conditions than the process

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referred to in the instant specification. Additionally, as noted above, Kobata '488 does not suggest any method or composition for the reduction or prevention of aluminosilicate scale, nor does Kobata '488 offer any motivation to one of ordinary skill in the art to modify the compositions therein to reduce or prevent aluminosilicate scale.

Even Kobata '488 itself recognizes that no single type of scale inhibitor can prevent all types of scale from forming – “[h]owever in the present condition a scale inhibitor effective for prevention of all kinds of scale kinds in this way has not been found.” Kobata '488, p.2, line 28. Accordingly, given the number and degree of differences between the boiler/cooling systems of Kobata '488 and the Bayer process, which the instantly claimed compositions may be used in, there simply would not have been any reason to expect that any polymers used to reduce silicic acid scale in the boilers/cooling water systems taught in Kobata '488 would be effective to reduce aluminosilicate scale.

Applicants submit that, absent a motivation to combine Kobata '488 with teachings of other art or knowledge, a prima facie case of obviousness is lacking. For a prima facie case of obviousness to exist, there must be some objective teaching in the art or knowledge generally available to lead one of ordinary skill in the art to combine the references.

Since no such motivation has been established by virtue of the outstanding Office Action, it is respectfully asserted that a prima facie case of obviousness has not been established. Furthermore, Applicants submit that Kobata '488 does not anticipate or make obvious the invention as presented in claim 10, and therefore claim 10 and the claims dependent therefrom are now in condition for allowance.

2. Rejections as to claim 12

In the present Office Action, claim 12 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kobata '488 further in view of Timmerman et al., US Patent No. 5,646,210 (hereafter Timmerman '210).

The polymers and processes of Kobata et al. are discussed in detail above.

As amended, claim 12 is now limited to a water soluble graft copolymer of specific formulas. The amendments to claim 12 are supported by the instant specification, as best seen in Example 4 at page 6. Because Timmerman '210 teaches a method of preparing solid polymer beads that are insoluble in water (See field of the invention, col. 1, lines 6-7), it is not feasible to one skilled in the art to prepare a water soluble graft copolymer in claim 12 of the instant application by modifying the polymer of Kobata '488 in view of the teachings of

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Timmerman '210. Claim 12 as amended is believed not to be anticipated or rendered obvious in view of the cited art and thus is now in condition for allowance.


Summary

Based on the arguments and amendments presented herein, Applicants respectfully request reconsideration and further examination of the application and the Examiner is respectfully requested to take such proper actions so that a patent will issue herefrom as soon as possible.

If the Examiner has any questions or believes that a discussion with Applicants' attorney would expedite prosecution, the Examiner is invited and encouraged to contact the undersigned at the telephone number below.

Respectfully submitted,
Donald P. Spitzer, et al.

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